

PROJECT NAME:	Roadside Drainage Retrofits	DATE:	12/14/07
ADDRESS/BLOCK & LOT	Multiple Right of Ways, Union and Bethlehem Townships		
FACILITY TYPE:	Drainage Ditches and Swales	PRIORITY:	As identified

1. ISSUES AND CONCERNS:

Roadside drainage ditches were observed throughout the Mulhockaway Creek Watershed. Ditches and swales convey runoff to the Creek and various tributaries throughout the watershed. Many are sparsely vegetated, actively eroding and contributing to runoff quality or quantity issues in the watershed. According to the stormwater inventory conducted by Hunterdon County Soil Conservation District, 25% of ditches and swales in approximately 4.3 miles of the watershed were failing or in poor condition, with exposed bare soil, sedimentation at the swale bottoms, and eroded side slopes. The impervious surfaces created by roadway pavement drastically increase runoff volumes and peak flow rates from the natural conditions in the watershed. Increased runoff volumes and peak flow rates cause many environmental concerns, including decreased recharge, decreased baseflow to local streams, increased erosion, elevated pollutant loads, and ultimately degraded water quality in lakes and streams. While the stormwater ditches are preferred to piped conveyance, there is potential to improve stormwater management by stabilizing and retrofitting the ditches into water quality swales.

2. EXISTING CONDITION BASED ON FIELD EVALUATION:

Currently, multiple stormwater ditches are located throughout the Mulhockaway Creek Watershed that can be characterized as being in poor condition and in need of stabilization and possible retrofit improvements. The most significant problems are observed in ditches with steep side slopes, narrow bottom widths, visibly eroded soils, and little or no permanent vegetation. In general, they accumulate and discharge sediment laden runoff from the roadways during significant rainfall events.

3. PROPOSED SOLUTIONS:

Where possible, the swales should be reconstructed to meet the design requirements set forth in the NJ Soil Erosion and Sediment Control Standards. In general ditches and swales should have wider bottom widths and maximum side slopes of 3:1. These dimensions can sustain a healthy grassy cover. In addition to stabilizing eroding soils and reconstructing the ditches, opportunities exist to retrofit many of these areas into water quality swales. The design of the swales will depend on site-specific parameters, such as the right of way width, depth to groundwater, nearby vegetation, and topography. In general, the water quality retrofits should include infiltration and bioretention media, native plantings and vegetation, and periodic gabion check dams to detain flows.

4. ANTICIPATED BENEFITS:

Water quality swales use natural processes, such as infiltration, evapotranspiration, and phytoremediation to manage stormwater from nearby roads. While the NJDEP BMP Design Manual does not explicitly give pollutant loading values for transportation areas, we can assume similar loading rates to commercial areas. According to the Manual, commercial areas generate 200 lbs/acre/year of total suspended solids (TSS) and 2.1 lbs/acre/year of Total Phosphorus (TP). The proposed water quality swales will greatly reduce the pollutant loading through detention and filtration processes. By regarding the swales with wider bottom widths and gentler side slopes, less erosion will occur within the swales and lower sediment loads to nearby streams. The proposed check dams also slow runoff velocities, detain water behind the dams, and trap sediment.

5. MAJOR IMPLEMENTATION ISSUES:

Any retrofits or design modifications will require that municipalities and the county road department work with project partners to allow for swale construction along the existing roadways. Specifically, local municipalities and the county will need to endorse these efforts and allow construction and provide routine maintenance of the stormwater BMPs. One of the most important components of implementing stormwater retrofits is to ensure that routine maintenance is provided and the systems function as they are designed.

TASK	DESCRIPTION			ESTIMATED COSTS	
1	Conduct pre-application meeting with Hunterdon SCD. Prepare final design plans and permits.			\$5,000.00	
2	Prepare Stormwater BMP Maintenance Plan per NJDEP requirements.			\$2,000.00	
3	Prepare construction documents and solicit quotes from contractors.			\$2,500.00	
4	Install stormwater BMP retrofits				
		QUANTITY	UNITS	UNIT PRICE	
	Mobilization/Erosion Control	100	LF	\$35.00	\$3,500.00
	Curb and Pipe Repair	100	LF	\$50.00	\$5,000.00
	Swale Construction	100	LF	\$100.00	\$10,000.00
	Closeout/Contingency (20%)	1	Percent	\$3,700.00	\$3,700.00
	Total Construction Cost			\$22,200.00	
				TOTAL COST: \$31,700.00	
				ANNUAL O&M COST: \$500.00	

Note: Construction and O&M costs are per 100 linear feet of swale/ditch



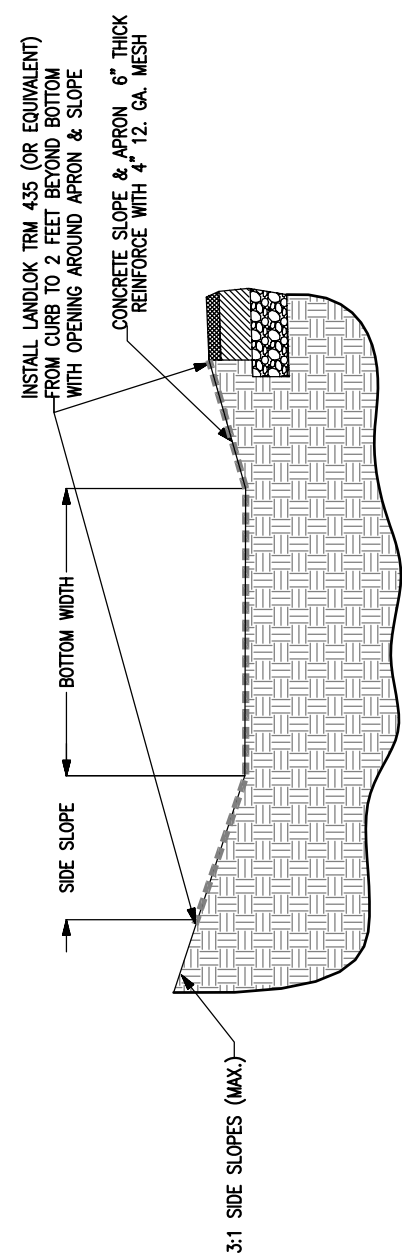
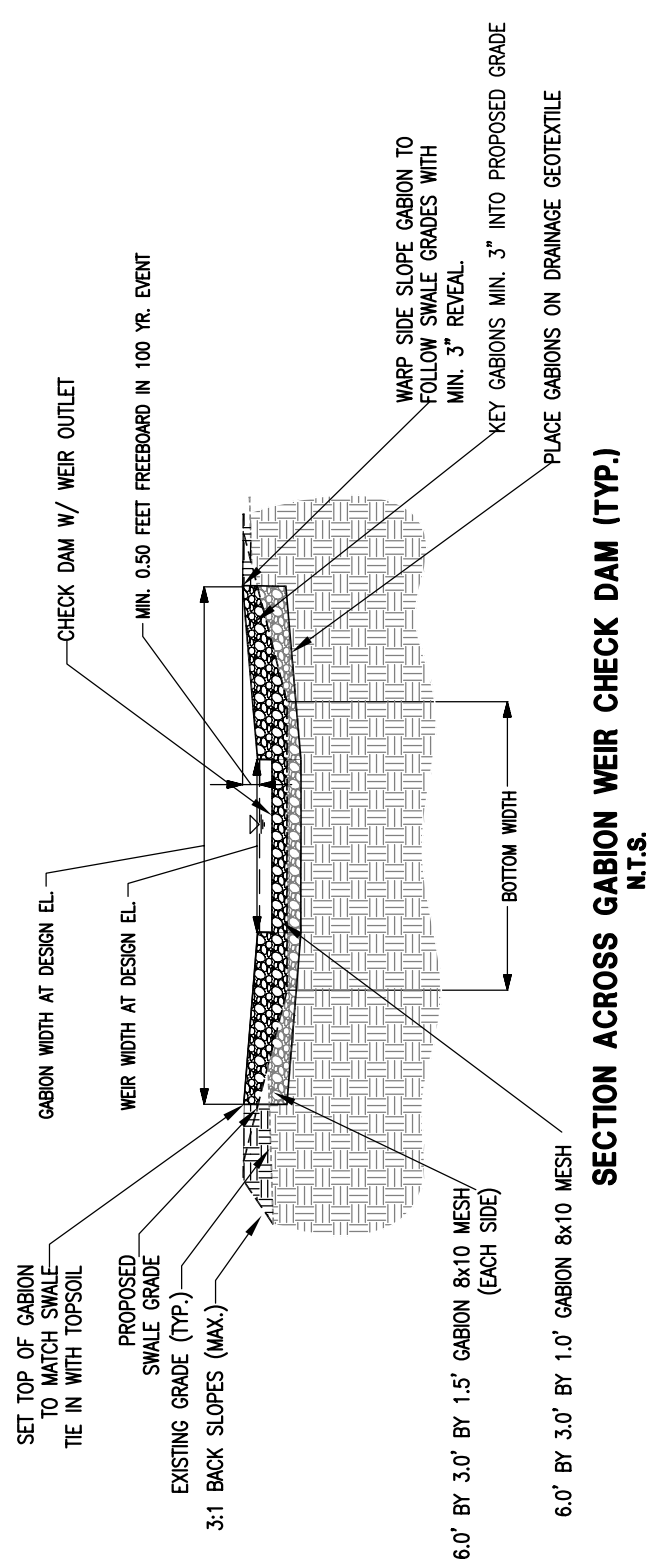
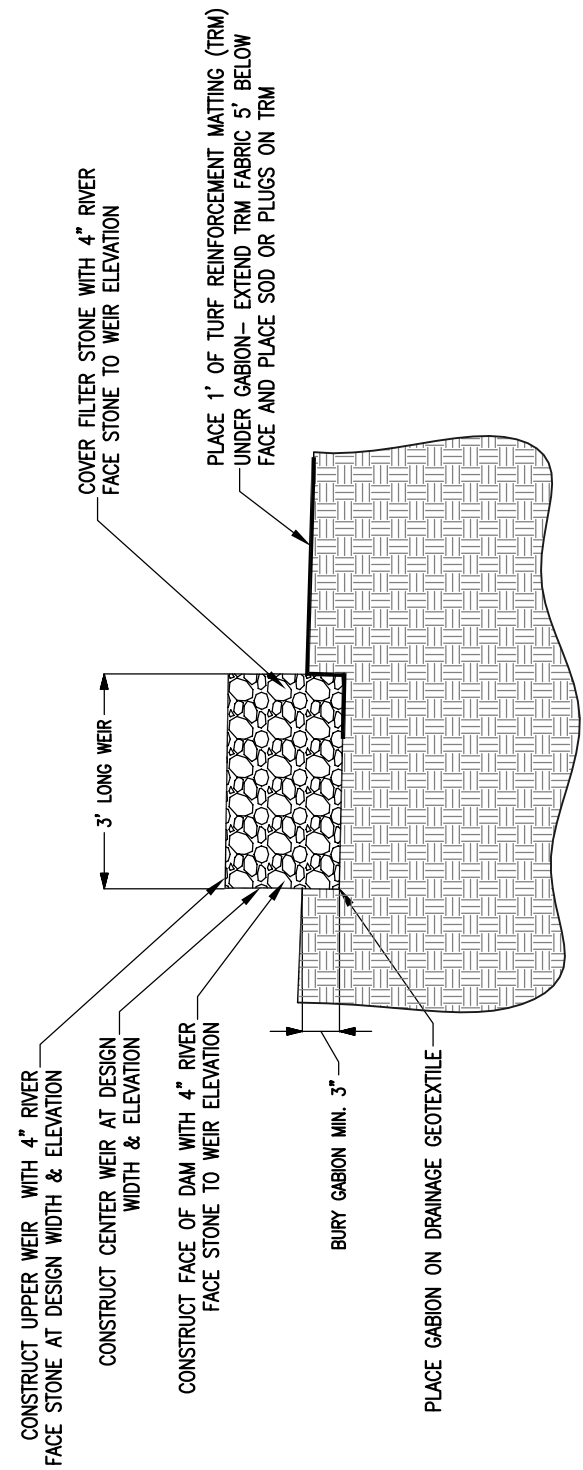
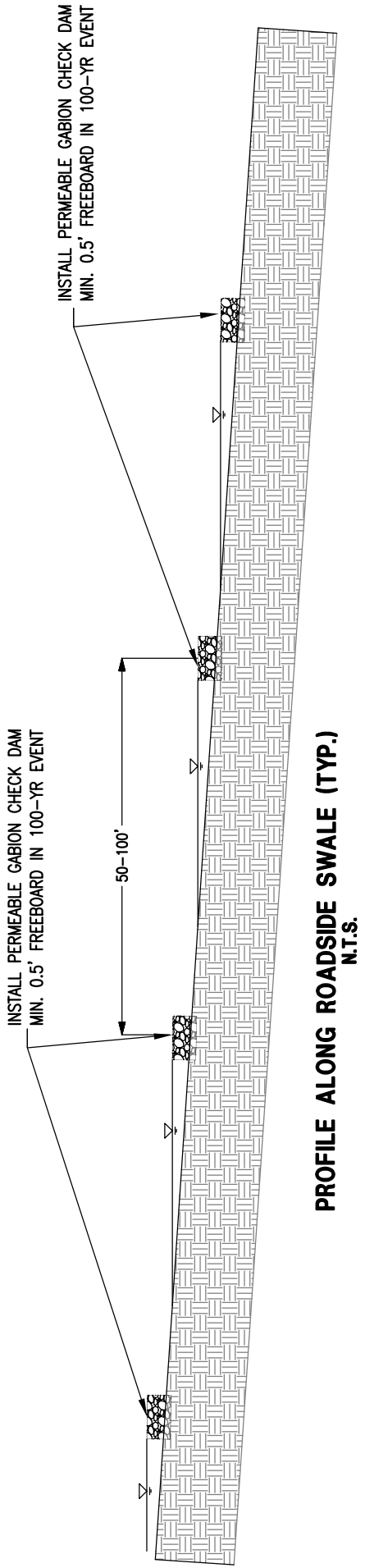
SDO-13&15 Ditch with steep side slope



SDO-186 Ditch with sediment deposition in channel



Open area near SDO-186 Ditch discharge



NOTE: BMP DETAILS ARE GENERIC AND ARE NOT MEANT FOR DETAILED
BMP DESIGN.

ROADSIDE SWALE DESIGN NOTES:

1. WHERE SPACE ALLOWS, DESIGN SWALE GEOMETRY IN COMPLIANCE WITH THE NEW JERSEY SEDIMENT EROSION AND SEDIMENT CONTROL STANDARDS AND SEED SWALE WITH ROADSIDE SWALE SEED MIX.
2. WHERE A STABLE CONDITION CANNOT BE REACHED, LINE EXISTING DITCH WITH RIP-RAP.
3. ALLOWABLE VELOCITY RANGES FROM 3.0-5.0 FEET PER SECOND FOR MOST SOILS IN THE STUDY AREA.

ROADSIDE SWALE DETAILS	
MULHOCKAWAY CREEK STORMWATER BMP RETROFITS	
DATE: DECEMBER 14, 2007	
SCALE: NTS	OMNI/ENVIRONMENTAL
SHT. NO. 1 of 1	321 WALL STREET PRINCETON, NJ 08540 PH: (609) 924-8821 FAX: (609) 924-8851